

10 Rec'd PCT/PTO 28 DEC 2004

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P1317MVD	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/02716	International filing date (day/month/year) 25.06.2003	Priority date (day/month/year) 28.06.2002
International Patent Classification (IPC) or both national classification and IPC G01N33/543		
Applicant THE SECRETARY OF STATE FOR DEFENCE et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I  Basis of the opinion
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 21.01.2004	Date of completion of this report 30.06.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Diez Schlereth, D Telephone No. +49 89 2399-7488



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/02716

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, Pages

1-9 as originally filed

### Claims, Numbers

1-19 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

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**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

the entire international application,

claims Nos. 19

because:

the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (specify):

the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

no international search report has been established for the said claims Nos. 19

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

the written form has not been furnished or does not comply with the Standard.

the computer readable form has not been furnished or does not comply with the Standard.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N) Yes: Claims 1-17  
No: Claims

Inventive step (IS) Yes: Claims 2,14-17  
No: Claims 1,3-13

Industrial applicability (IA) Yes: Claims 1-17  
No: Claims

2. Citations and explanations

see separate sheet

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item V

1.) Reference is made to the following documents:

D1: D. Müller-Schulte & H. Brunner (1995) J. Chromatogr. A 711, 53-60  
D2: WO-A-98/54578  
D3: JP-A-07 140 143  
D4: EP-A-0 480 361  
D5: US-A-5,156,971

2.) While the arguments given by the applicant in his letter of 15.06.04 have been considered, the subject-matter of claim 1 and 3-13 (partially, as dependent thereon) is considered to be novel (Art. 33 (2) PCT), but not inventive within the sense of Art. 33 (3) PCT, for the following reasons:

- The wording of claim 1 encompasses embodiments in which the analyte to be detected contains per se a haem moiety (such as a native or glycated haemoglobin molecule);  
- Claim 1 defines the pH of the buffer used for releasing haem moieties (the wording of the claim includes examples in which the haem moiety is released with the whole analyte molecule) by the result to be achieved (sufficiently alkaline to release...) instead of by a certain value or range of values (see PCT Guidelines III-4.7). Therefore, in the absence of a clear definition of this (apparently essential) technical feature, it is assumed that the buffer used in D1 (pH = 8.5) is sufficiently alkaline to release the haem-containing molecules from the magnetic particles while being sufficiently mild for not enabling extraction of inorganic iron from said particles (it is noted that in the present application a buffer of pH 12.5-13.5 is used for releasing haem moieties, see claim 2).

In view of the above comments, the method of claim 1 differs from that of D1 only in that the amount of released haem moieties is measured with a chemoluminescent assay in the presence of luminol (see below).

D1 (closest state of the art as regards this claim) discloses an assay for detection of glycated hemoglobin (gly-Hb) in blood in which magnetic particles comprising  $Fe_3O_4$  are coated with aminophenyl-boronic acid and brought in contact with a sample containing gly-Hb. After binding, gly-Hb is released by washing the particles with an alkaline buffer and the amount of gly-Hb (comprising haem moieties) is measured spectrophotometrically at

414 nm (see experimental part).

However, the selection of a chemoluminescent assay for measuring haem moieties in a sample seems to be an obvious alternative, which falls within the routine practice in this technical field and does not result in any unexpected technical effect. The attention of the applicant is drawn to D2 (example 2), which discloses a magnetic-bead-based assay for detection of gly-Hb similar to that of D1 in which (bound) haem moieties are measured using a chemoluminescent assay in the presence of a lucigenin (a luminol derivative) conjugate; and to D3 (abstract), which discloses a similar assay for detecting occult hemoglobin in feces but using magnetic particles coated with anti-Hb antibody.

The skilled person equipped with the teaching of D1 and D2 (or D3) would consider obvious to detect the haem moieties released in the method of D1 using the chemoluminescence assay of D2 (or D3), thus arriving at a method as claimed in claim 1.

Analogous arguments apply to the subject-matter of claims 3-13 (partially, as dependent thereon), which contain only features which relate to obvious procedural alternatives which fall within the routine practice in this technical field.

3.) Novelty and inventive step (Art. 33 (2) and (3) PCT) could be acknowledged for the subject-matter of claims 2 (complete), 3-13 (partially) and 14-17 (complete), for the following reasons:

Using a buffer with a pH of 12.5-13.5 allows to use a magnetic particle based chemoluminescent assay for accurately measuring the amount of haem-iron present in a sample without having any interferences due to inorganic iron from a magnetic particles.

None of D1-D5 deals with this problem. D1 discloses a magnetic particle based spectrophotometrical assay in which haem-iron is measured without releasing the haem moiety from the analyte molecule. D2 and D3 describe a magnetic particle based chemoluminescent assay for measuring haem-iron without giving any hint about the pH used for releasing haem moieties from the particles. D4 (p. 5, l. 12 to p. 6, l. 30) discloses a chemoluminescent assay in which the luminol reaction is carried out at a pH between 12-13.5 for releasing haem-iron from the analyte molecule. However, this assay does not involve the use of magnetic particles. D5 (abstract) discloses a luminol chemiluminescent assay (without magnetic particles) for the detection of *Bacillus anthrax* spores.

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Analogous arguments apply for the subject-matter of claims 14-17, which relates to a kit that is specially adapted to carry out the method of claim 2.